Assessing Trail Conditions: A Sampling of the Appalachian Trail

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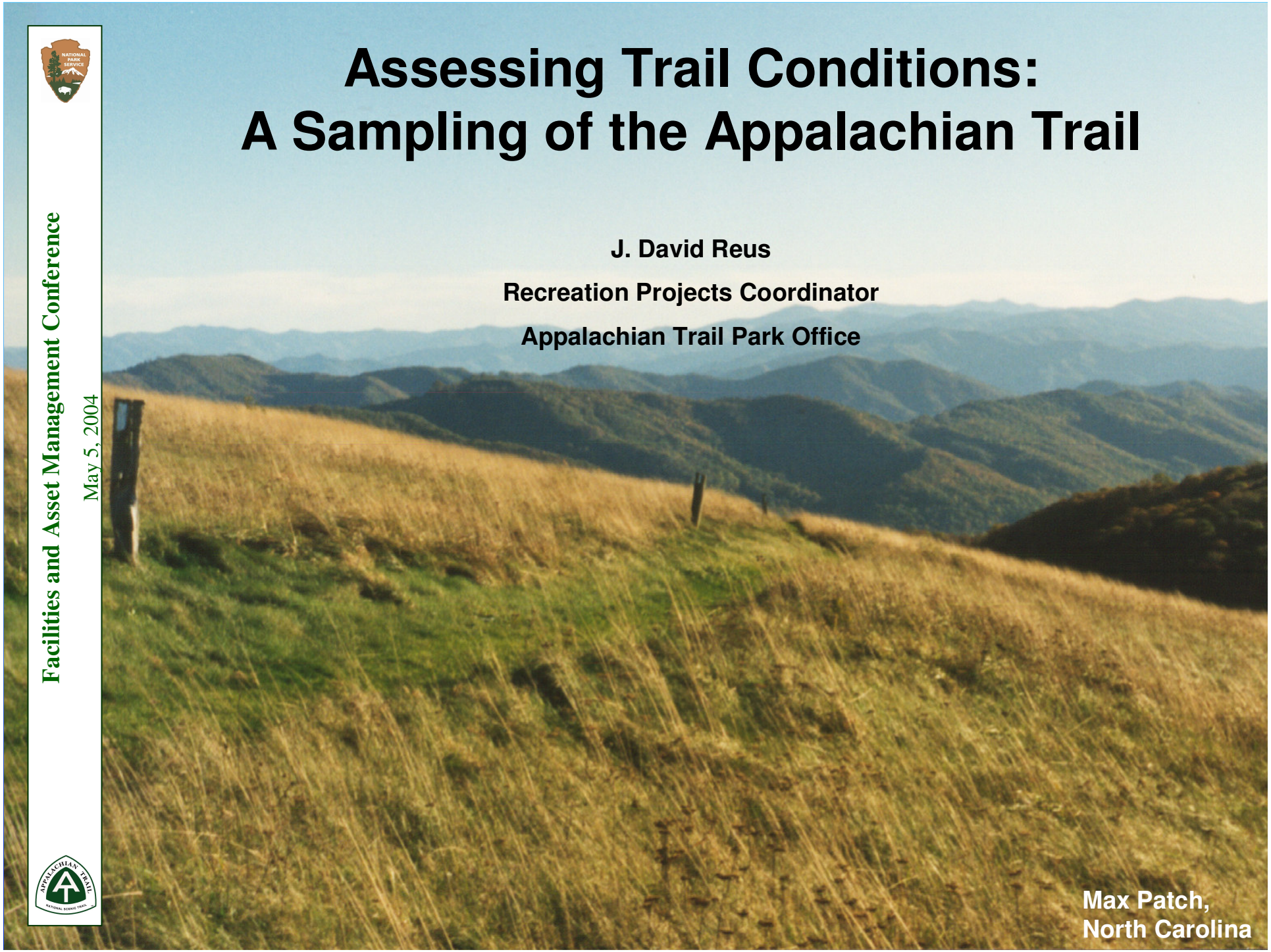
Facilities and Asset Management Conference

May 5, 2004



Max Patch, North Carolina

QUICK FACTS

- A.T. proposed by Benton MacKaye as a "project in regional planning" in 1921

- Designated as first national scenic trail in the National Trails System Act in 1968

- An estimated 3 to 4 million visitors hike a portion of the trail each year

- Day-to-day management has been formally delegated to the Appalachian Trail Conference and Maintaining Clubs

- Maintenance of the trail and trail facilities is performed by volunteers

- Complex multi-jurisdictional cooperative management and maintenance system

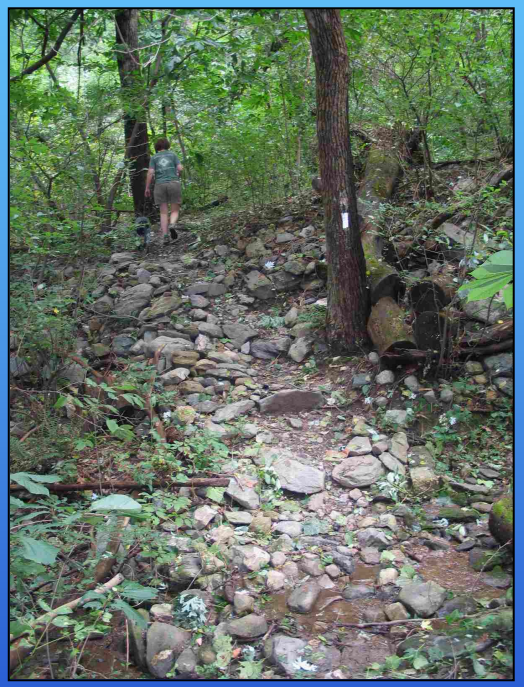
WHAT IS A TRAIL ASSESSMENT?

- A process to inventory trail assets, determine their condition, and develop plans for correcting any identified deficiencies

- Conducted on regular cycle

- Provides information for project planning, prioritizing, and budgeting

- It is a cooperative system involving all partners



Typical Treadway

EVOLUTION OF THE TRAIL ASSESSMENT

- Prior to 1987, each individual maintaining club may or may not have conducted a formal assessment

- No standardized system or terminology

- Collection cycles varied

- Information not available centrally to management staff

Early Assessment

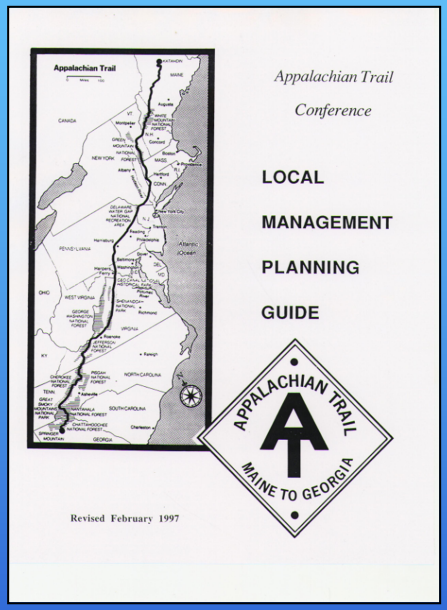
FORMAL TRAIL ASSESSMENT

- In 1987, the Appalachian Trail Conference developed a formal Trail Assessment process

- A standard form and accompanying manual were deployed across the entire A.T.

- Information was collected on paper in the field and entered into a centralized database

- Assessments completed every 5 years (20% of the A.T. per year)



Assessment Guide

REVISED TRAIL ASSESSMENT

- In 2002, a revision of the process was begun to meet the emerging needs of agency mandates, primarily the NPS Facility Management Software System (FMSS), but also USDA Forest Service Infrastructure Application (INFRA)

- Advances in GPS technology and integration with developing GIS data were incorporated into the process

Comparing GPS Units

FMSS INITIATIVE

- A.T. required to inventory and assess 100% of assets and calculate total differed maintenance by September 30, 2004
- Primary Asset is the Trail itself (divided into 81 separate assets based on management jurisdictions)
- Other assets include shelters, privies, campsites, parking lots, trail bridges, buildings, corridor lands, and dams - more than 1,000 total assets

Typical Shelter Asset

CHALLENGES

- A.T. is 2,170 miles long
- Stretches across 14 states, 15 Federal lands units, and 67 State Owned Public Land Units
- No Facility Maintenance Staff
- Limited Appalachian Trail Conference Staff Time to Support Initiative
- Decentralized Maintenance Activities
- Tight Time Line for Completion

Volunteer Maintainer

OPTIONS

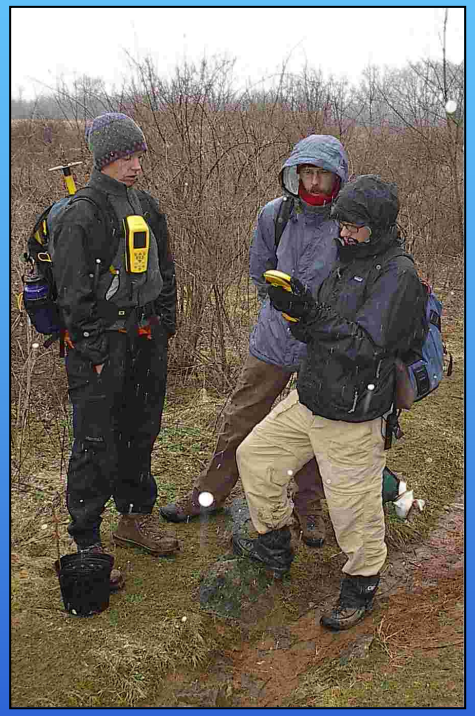
- Don't Do It.

- Hire Team(s) or Recruit Volunteers to Complete the Condition Assessment by Hiking the Entire Trail

- Rely on Individual Clubs to Submit Assessments for their Sections

- Redirect Staff Resources to Focus Entirely on Assessments

- Use A Sampling Methodology to Generate Total Deficiencies



Sampling

SAMPLING RULES

- **Need Sufficient Number of Samples**
- **Need Sufficient Sample Size**
- **Sample Sections Must be Same Length**
- **Samples are Representative of Total Mileage**
- **Sample Must be Random**

"There are three kinds of lies: lies, damn lies, and statistics."

Benjamin Disraeli

SAMPLING METHODOLOGY

- Commitment to Assess 20% of the Trail in the Field

20% X 2,000 miles = 400 miles

- Number of Samples to Achieve Statistical Significance

80 Samples

- Sample Length

400 miles/80 samples = 5 mile samples

- Sample Stratified to be Representative of Different Trail Conditions (based on ATC Regions and EPA EcoRegions level III)

4 Regions/80 samples = 20 samples per region

SAMPLING METHODOLOGY

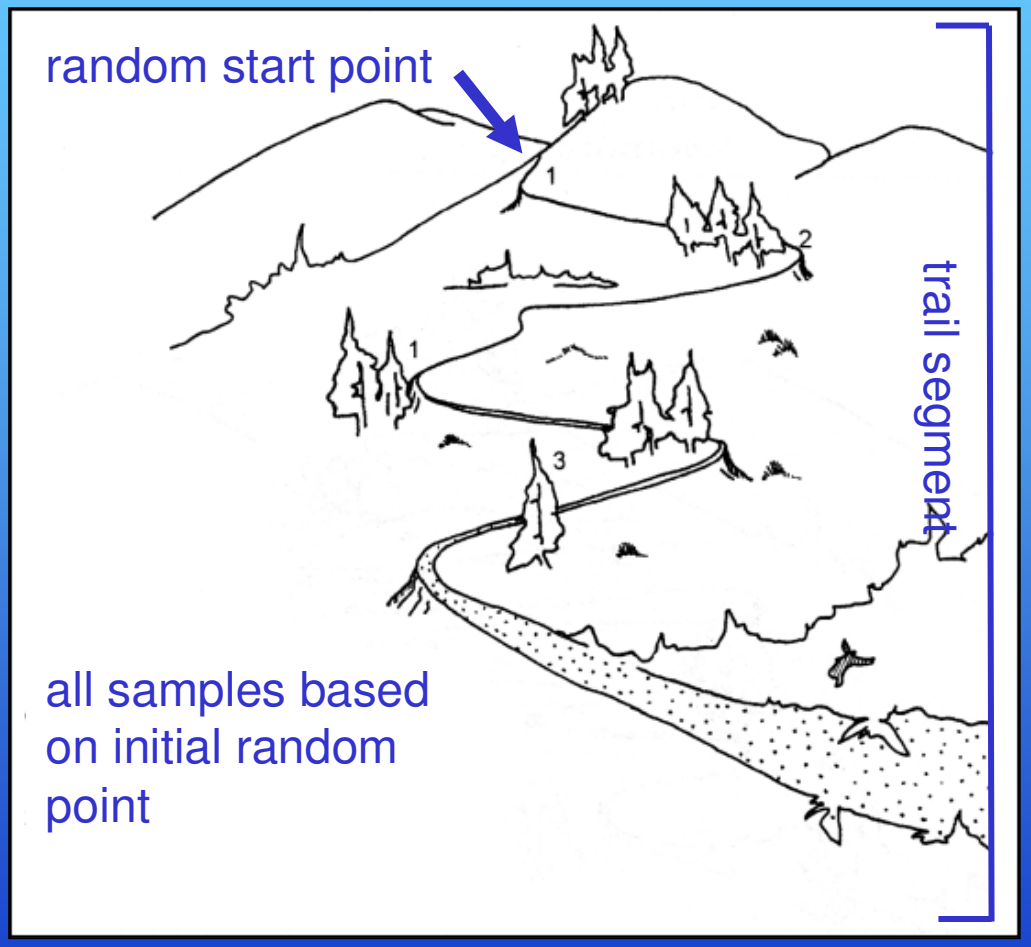
- Random Factor Introduced by Randomly Selecting the Start Point for the first Sample Section in Each Region

- Randomly Selecting the Starting Point Ensures that any Section has an Equal Chance of Being Selected as a Sample

- Each Subsequent Sample Section Begins at Equally Spaced Intervals

SAMPLING METHODOLOGY

- **The Random Start Point is Based on Sampling Methods Used to Assess Other Linear Resources Such as Roads and Rivers**



EXAMPLE SAMPLING

- **Interval Between Regional Sample Points:** southern region: 464.2 miles/20 samples = 23.2 mile interval between each 5 mile sample
- **Random Start Point was Generated at:** WWW.RANDOM.ORG
- **Randomly Generated Southern Start Point:** random integer between 1 and 23.2 was selected = 4
- **First Sample Section:** mile 4 to mile 9
- **Second Sample Section:** mile 4 + 23.2 mile interval = mile 27.2

EXAMPLE SAMPLING

- 20 Samples generated
- 5 Miles each sample
- 23.2 Miles between each sample
- Representative of all 464.2 miles in the region

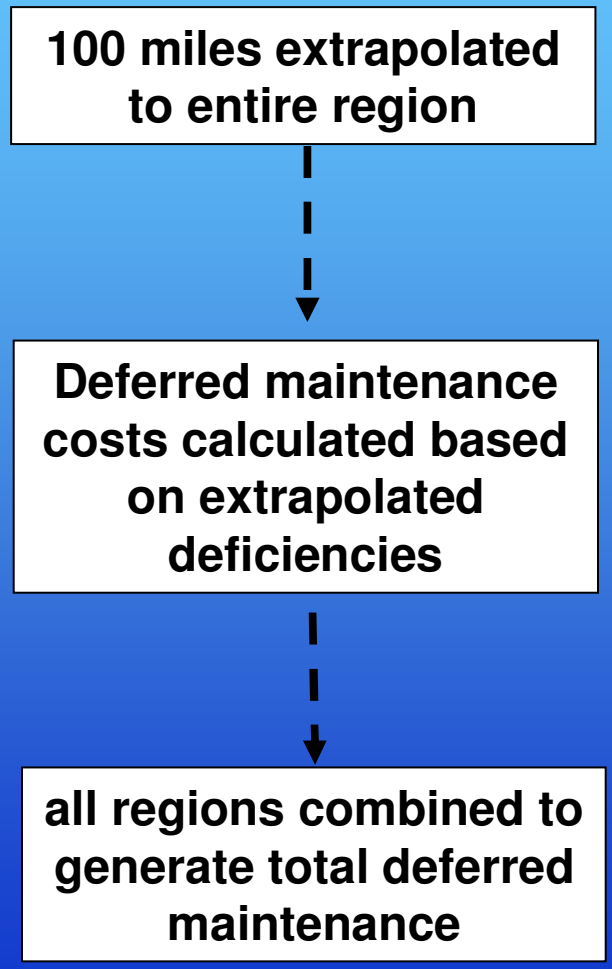
SOUTHERN SAMPLES	Start	Finish	Start Name	Start Mileage	Finis
Sample #1	4	*9*	Virgina-Tennessee Line	3.5	Abington Ga
Sample #2	27.2	*32.2*	Turkey Pen Gap	27.6	Vandevente
Sample #3	50.4	*55.4*	Dennis Cove, USFS 50	50.4	Moreland Ga
Sample #4	73.6	*78.6*	19E, Roan Mtn/Elk Park	71.9	Hump Moun
Sample #5	96.8	*101.8*	Iron Mountian Gap (NC 226/TN1070	99.4	USFS 230
Sample #6	120	*125*	Nolichucky River	118.5	No Business
Sample #7	143.2	*148.2*	Sams Gap, US 23	143	Rector Laur
Sample #8	166.4	*171.4*	Little Laurel Shelter	166.7	Allen Gap, N
Sample #9	189.6	*194.6*	Deer Park Mountain Shelter	189.6	Lemon Gap,
Sample #10	212.8	*217.8*	Deep Gap	212.6	Waterville S
Sample #11	236	*241*	Tri-Corner Knob Shelter	237.9	Pecks Corne
Sample #12	259.2	*264.2*	Mt. Collins Shelter	258	Double Spri
Sample #13	282.4	*287.4*	Mollies Ridge Shelter	283.2	Birch Spring
Sample #14	305.6	*310.6*	Cody Gap	10.6	Stecoah Ga
Sample #15	328.8	*333.8*	Tellico Gap, NC 1365	37.3	Burningtowr
Sample #16	352	*357*	Wallace Gap	59.8	Big Spring S
Sample #17	375.2	*380.2*	Deep Gap, USFS 71	81.1	Sassafras G
Sample #18	398.4	*403.4*	Tray Mountain Shelter	107.3	Unicoi Gap,
Sample #19	421.6	*426.6*	Tesnatee Gap, GA 348	127.3	Neels Gap,
Sample #20	444.8	*449.8*	Cooper Gap, USFS 42/80	151.9	Logging Roa

CALCULATING THE DIFFERED MAINTENANCE

- Once All the Sample Sections have been Assessed in Each Region, the Deficiencies are Extrapolated to the Remaining Mileage in that Region:

- The Extrapolated Total Deficiencies are used to Calculate the Total Deferred Maintenance in Each Region

- The 4 Regional Totals Make up the Entire Differed Maintenance for the A.T. Treadway



PROS

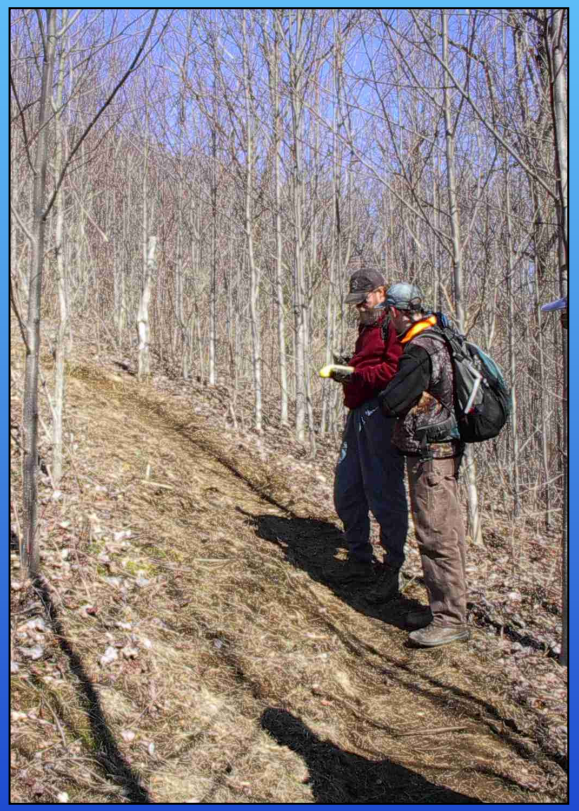
- Reduced Staff Time in the Field
- Accurate Field Assessment for 20% of the Trail
- Provides Baseline Data for Future Assessments
- High Level of Confidence in Extrapolated Deferred Maintenance Totals

CONS

- Extrapolated Data is Not Sufficient for Planning Specific Projects
- Must be Supplemented with Field Data
- Random Factor Presents Logistical Problems

ASSESSING THE APPALACHIAN TRAIL

- Easy to Conduct
- Accurate Information
- Standardized Data
- Consistent Assessments
- Efficient Data Collection
- Effective Data Management
- Useful Management Information



OPTIONS

- Remember All the Deficiencies

- Note Deficiencies Using a "Dot Tally" Sheet

- Record Deficiencies with a Data Collection Sheet or a Dictaphone and Note Mileage Points with a Wheel

- Use GPS to collect Locations and Note Deficiencies at those points with a Data Collection Sheet or PDA

- Use an Integrated GPS Unit – With Data Dictionary Capability

GPS –
Good Pencil System

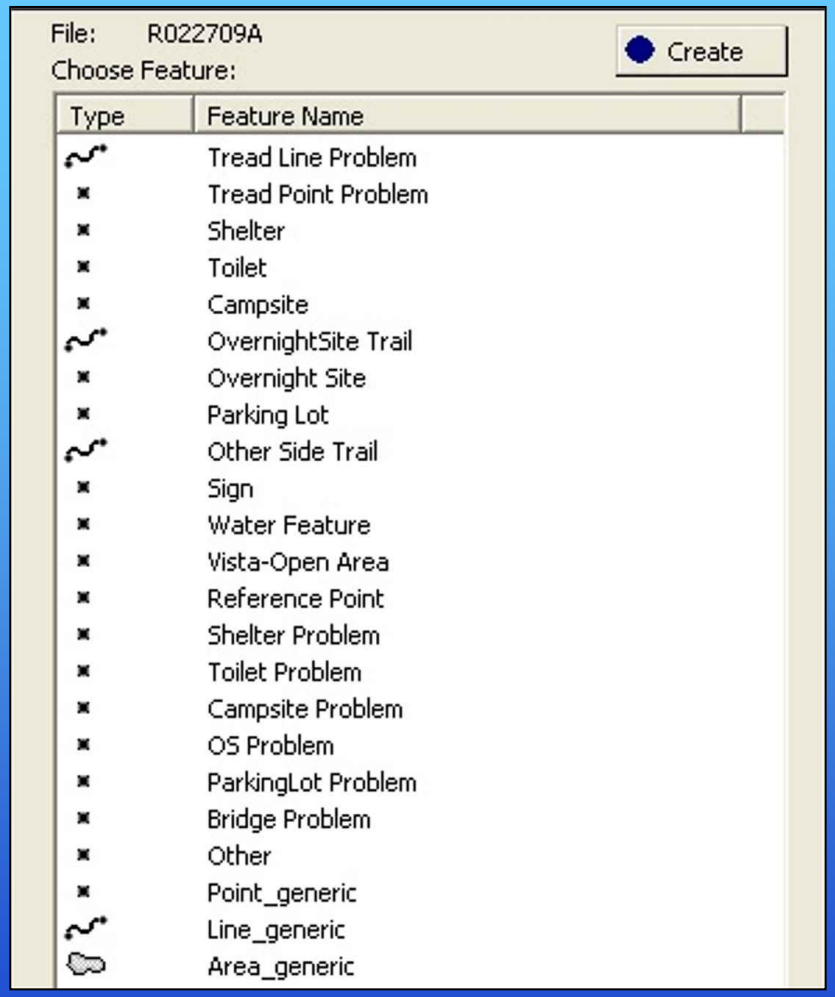
GPS + DATA DICTIONARY

- Records Accurate Geographical Location
- Incorporates Standard Data Dictionary
- Integrated Design – No Cords
- Transfer Data Directly to GIS or Other Database
- Easy to Use (once you get the hang of it!)

Trimble Geo XT

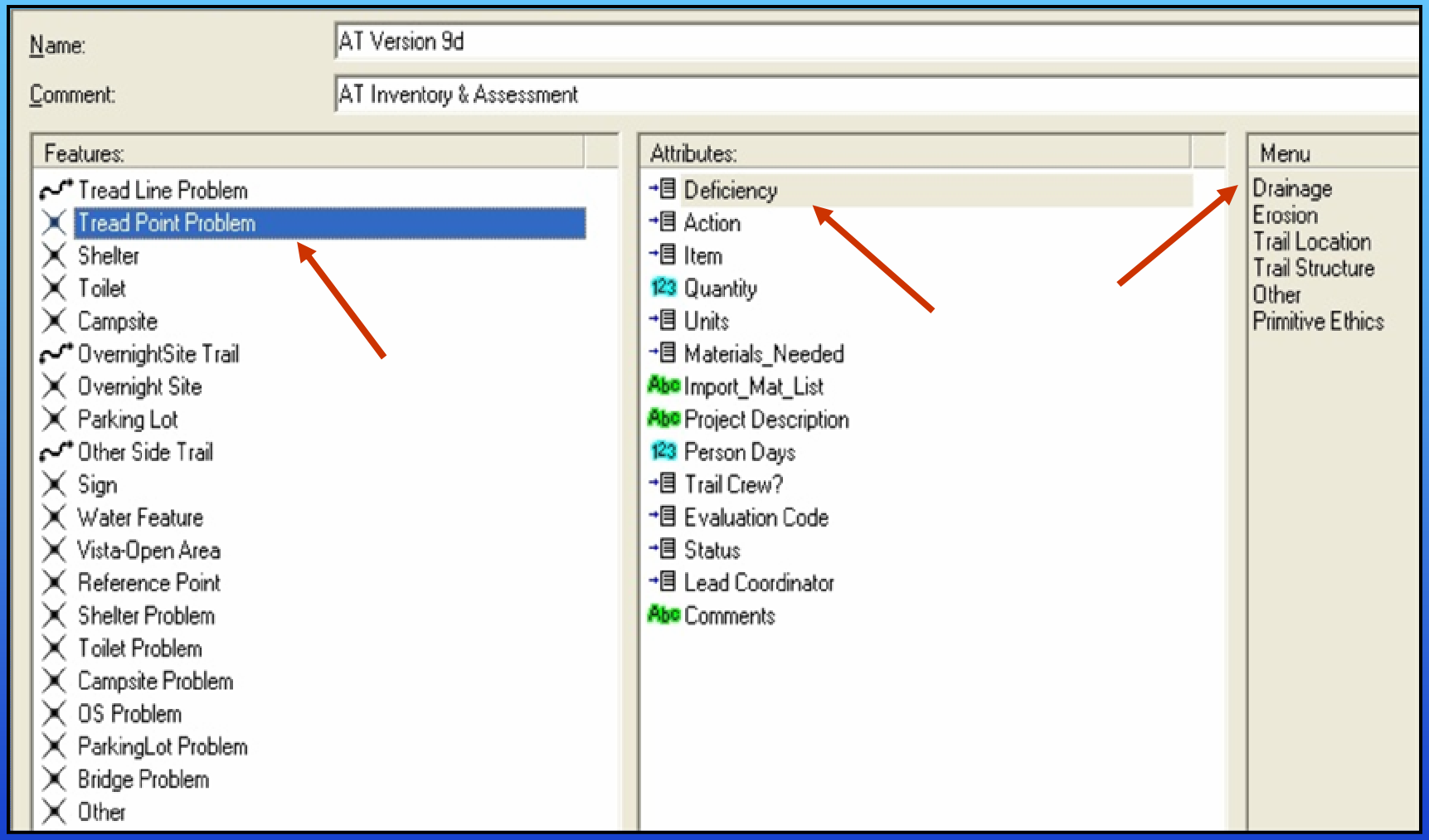
DATA COLLECTION

- "Data Dictionary" Standardizes Data Collection Entries
- Menus are Used to Speed Data Collection and to Ensure Consistency
- Can be Designed to Capture Both Inventory and/or Deficiency Data
- Information is Entered Into the Data Dictionary as the GPS Records the Location



Trimble TerraSync

DATA DICTIONARY



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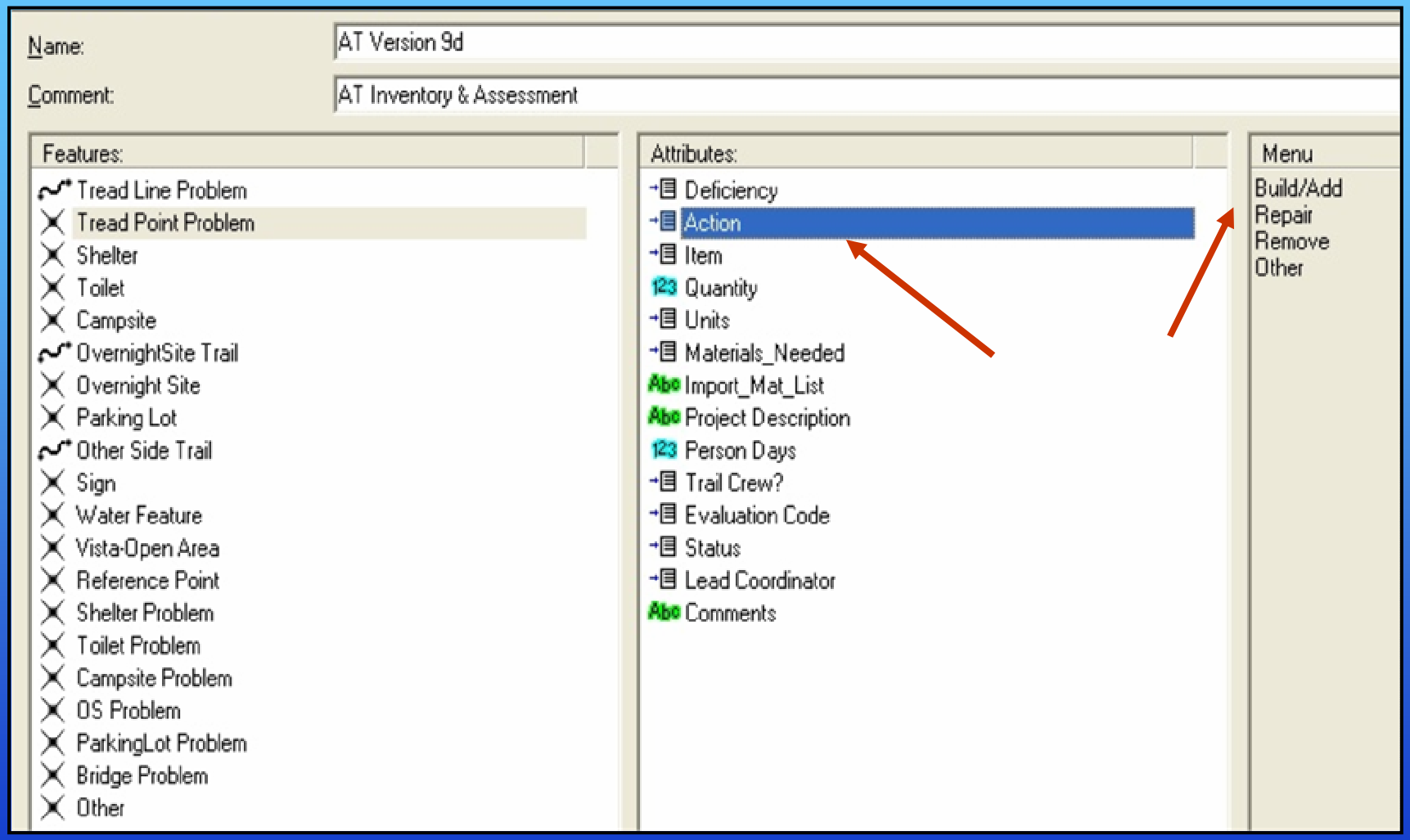

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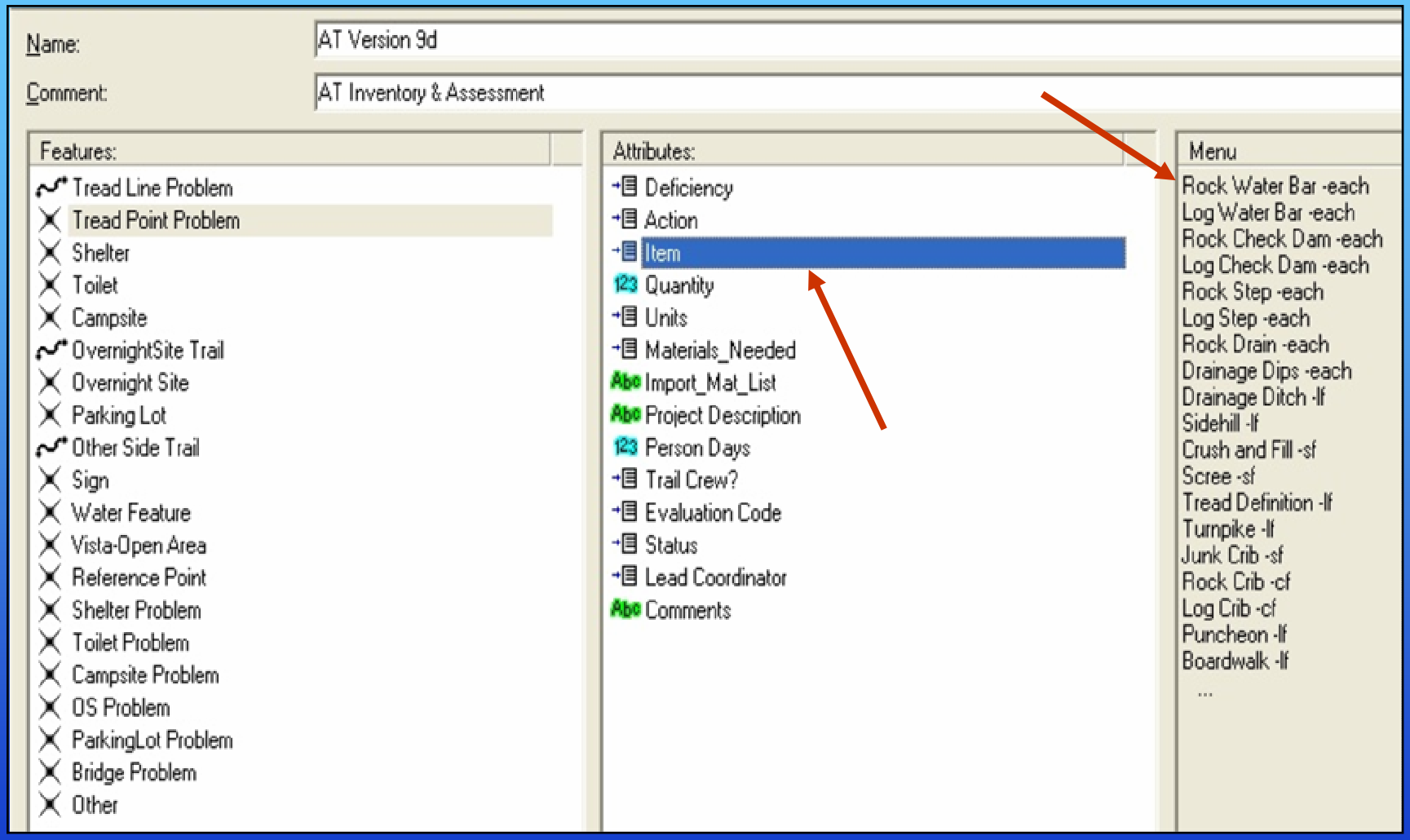


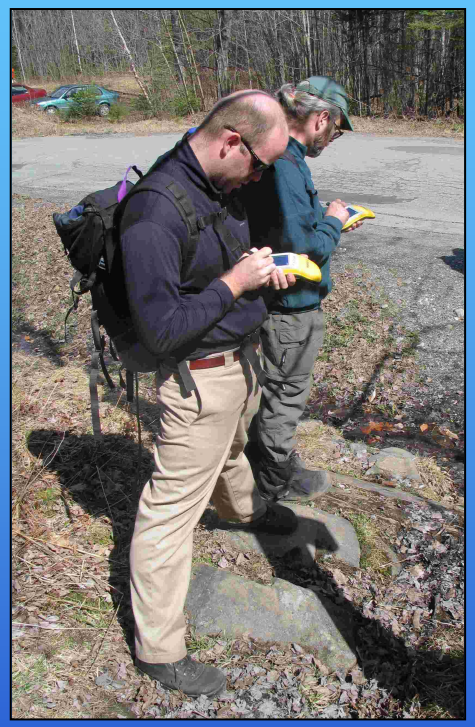
PICTURES

- Digital Pictures Capture Inventory and Deficiencies

- Can be Referred to During Project Planning

- Can be linked directly to GPS points and integrated into a GIS

- Digital Pictures are Easy to Store and Organize



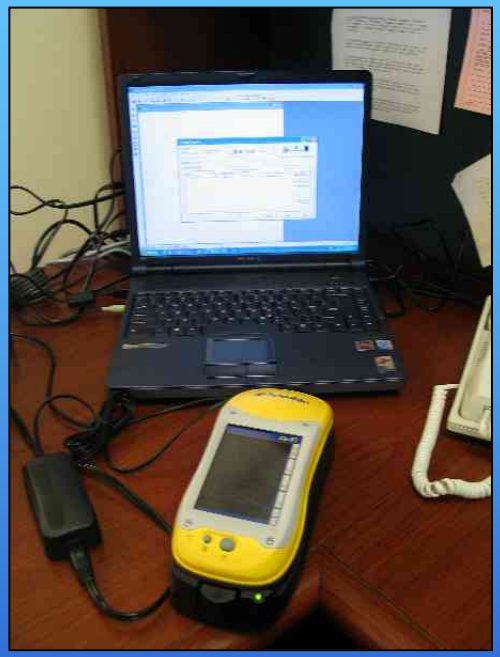
PROCESSING

- GPS Data and Pictures are Transferred to Computer

- GPS Location Data Must be Corrected to Increase Accuracy

- Feature Data Should be Edited to Correct Mistakes or Add Additional Information

- Information is Exported to Appropriate Format



Transferring Data

VIEWING THE DATA

Microsoft Excel - table1.dbf

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A1 DEFICIENCY

	A	B	C	D	E	F	G	H
1	DEFICIENCY	ACTION	ITEM	QUANTITY	UNITS	MATERIALS	PROJECT_DESCRIPTION	TRAIL CREW
2	Trail Structure	Repair	Stile -each	1	Each	2X4 LUMBER	BOTTOM STEP IS ROTTING-NEEDS TO BE REPLACED SO	No
3	Erosion	Build/Add	Log Water Bar	3	Each		NEED 3 WATER BARS - SUGGEST USING NATIVE MATER	No
4	Primitive Ethics	Build/Add	Sign -each	1	Each		REPLACE METAL POST WITH WOOD	No
5	Trail Structure	Build/Add	Blazes -each	1	Each	2X4 LUMBER	BOARD THAT BLAZE IS ON IS BROKEN AND DETACHED F	No
6	Drainage	Repair	Sidehill -lf	20	Linear Feet		REDUCE SIDEHILL OUTSLOPE	No
7	Trail Structure	Repair	Railing -lf	26	Linear Feet	2X4 LUMBER	RAILING IS LOOSE - NEEDS REPAIR	No

Microsoft Access - [table1 : Table]

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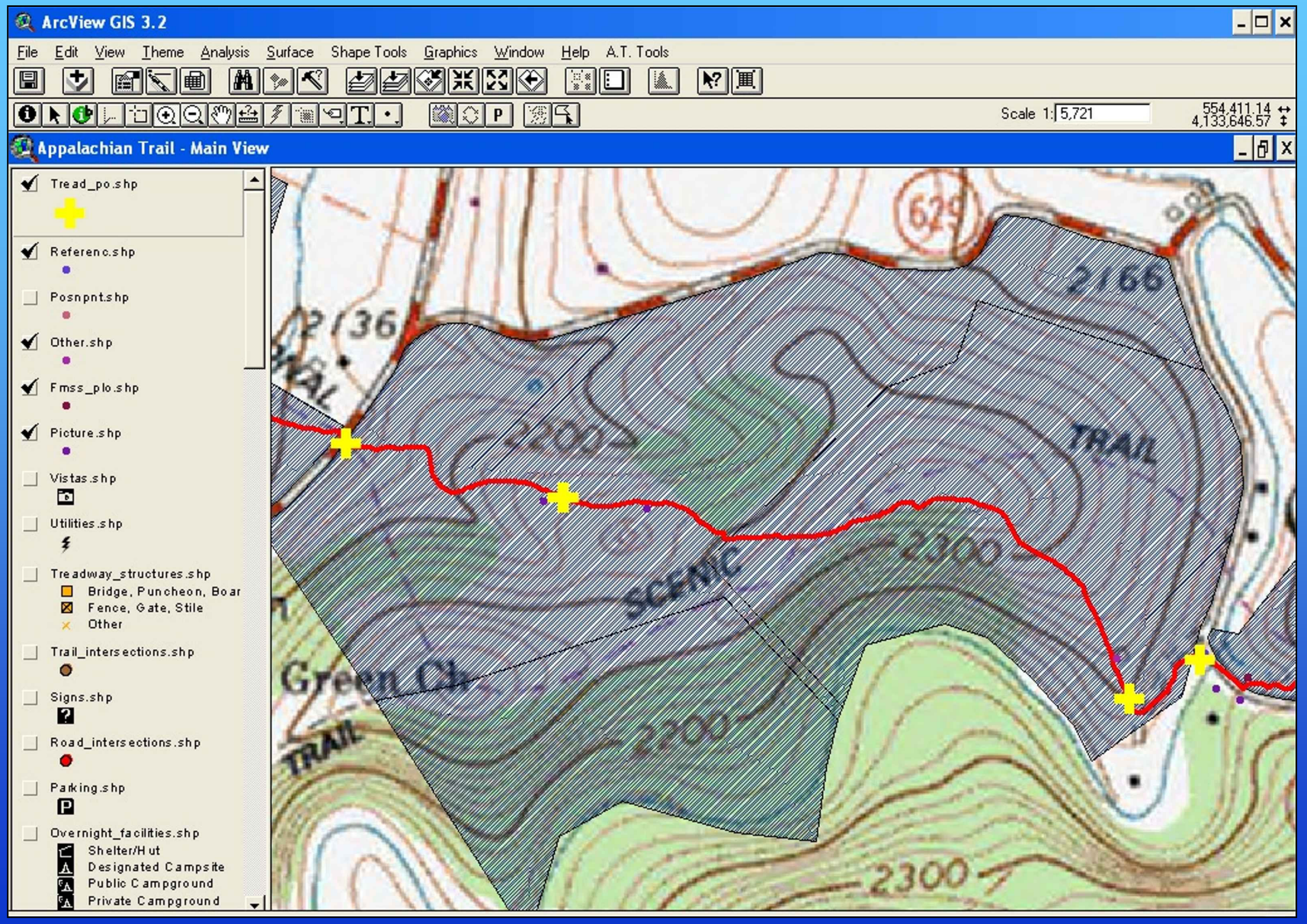
	DEFICIENCY	ACTION	ITEM	QUANTITY	UNITS	MATERIALS	PROJECT_DE	TRAIL_CREW
▶	Trail Structure	Repair	Stile -each	1	Each	2X4 LUMBER	BOTTOM STEP IS ROTTING-NEEDS TO BE REPLACED SOON	No
	Erosion	Build/Add	Log Water Bar -	3	Each		NEED 3 WATER BARS - SUGGEST USING NATIVE MATERIALS	No
	Primitive Ethics	Build/Add	Sign -each	1	Each		REPLACE METAL POST WITH WOOD	No
	Trail Structure	Build/Add	Blazes -each	1	Each	2X4 LUMBER	BOARD THAT BLAZE IS ON IS BROKEN AND DETACHED FROI	No
	Drainage	Repair	Sidehill -lf	20	Linear Feet		REDUCE SIDEHILL OUTSLOPE	No
	Trail Structure	Repair	Railing -lf	26	Linear Feet	2X4 LUMBER	RAILING IS LOOSE - NEEDS REPAIR	No
*								

VIEWING THE DATA



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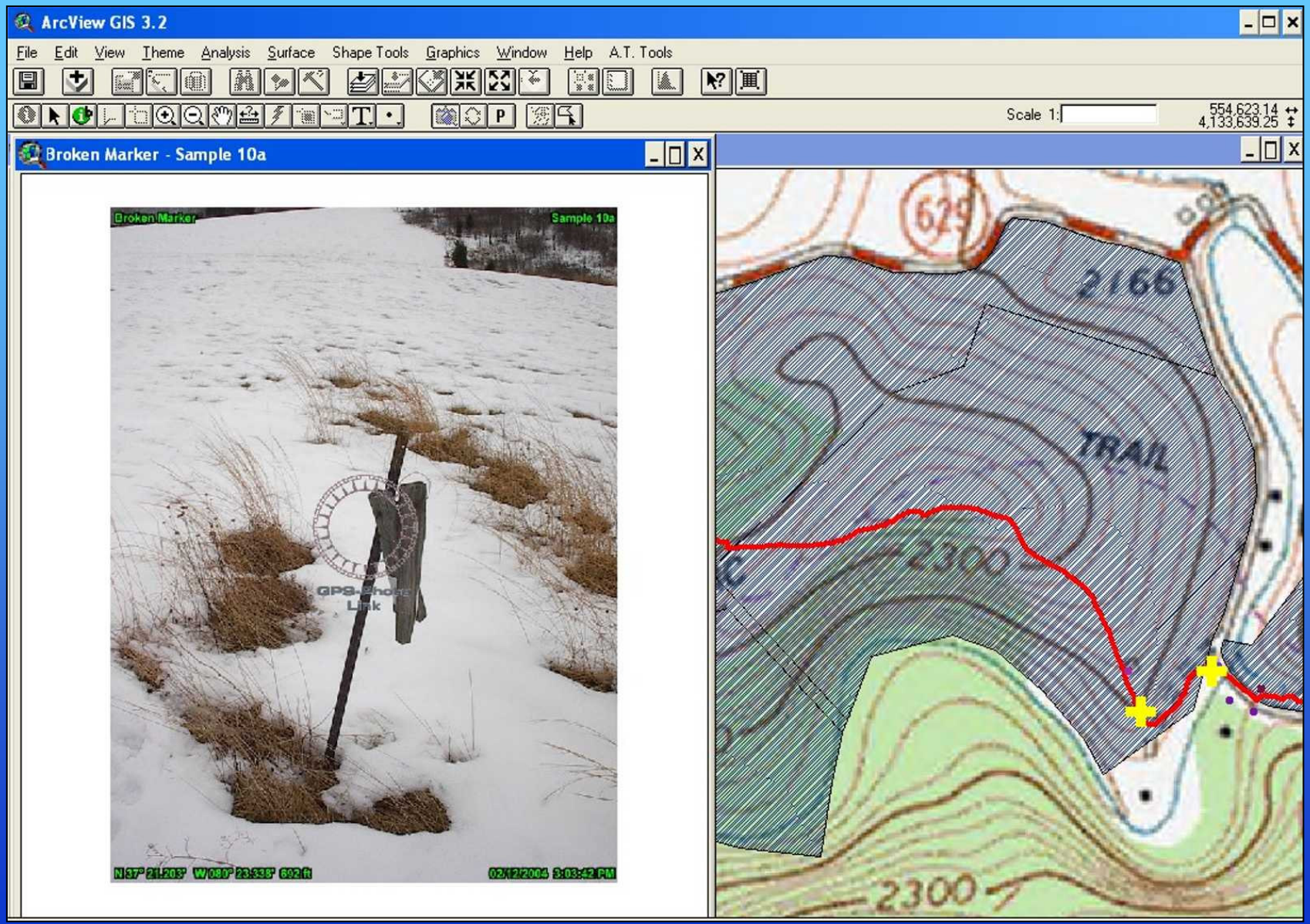

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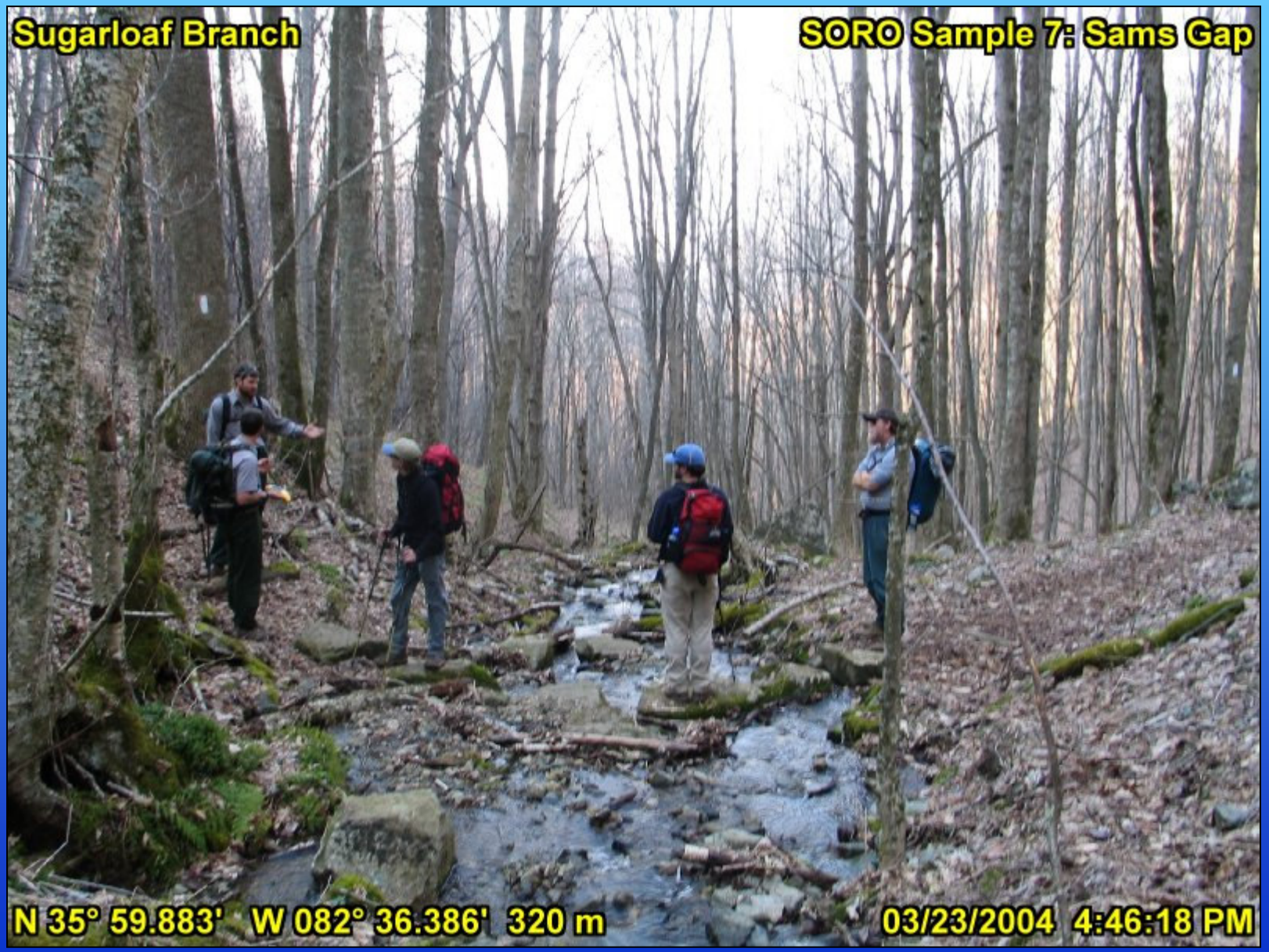

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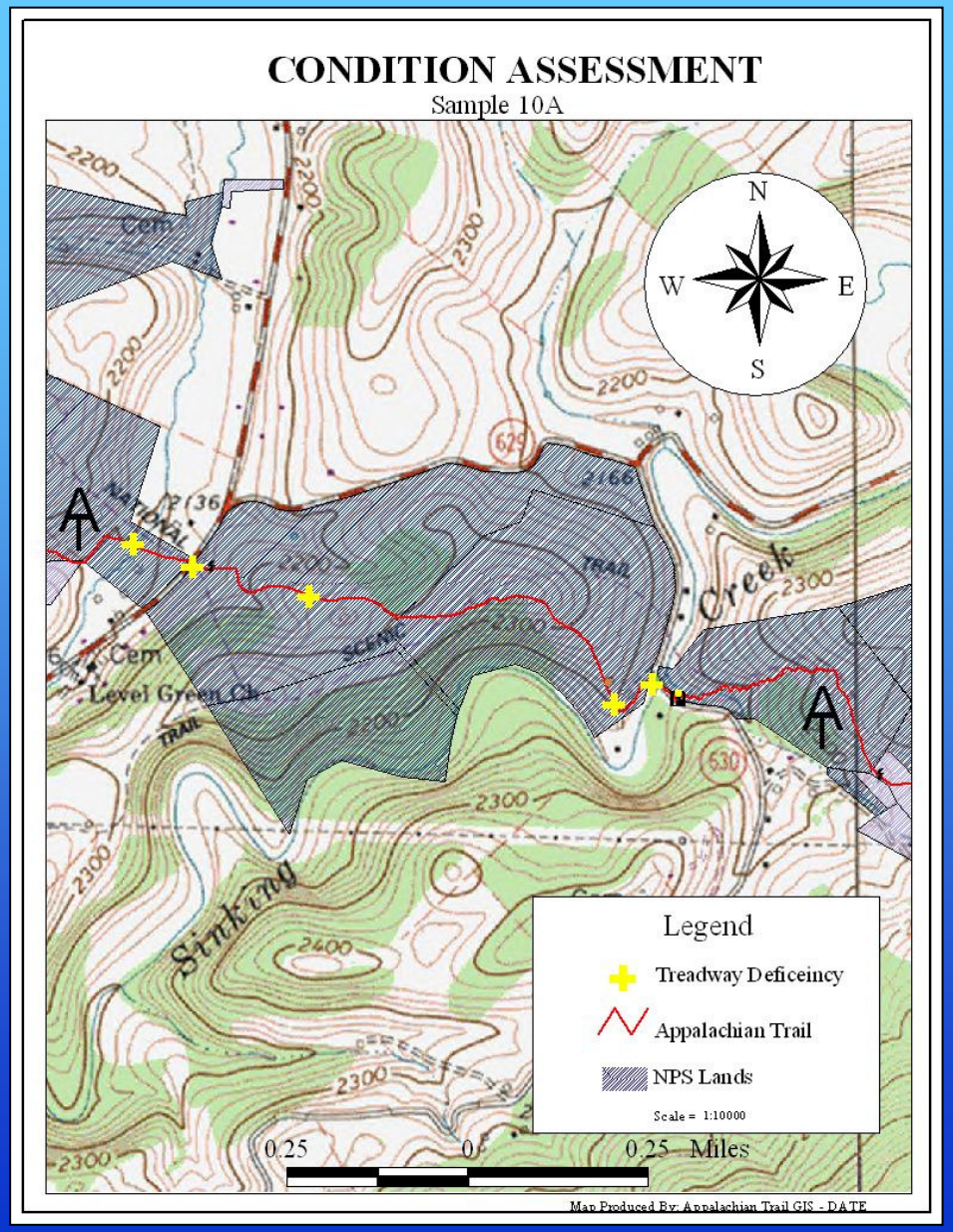

THE END

Katahdin,
Maine